



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,127	10/06/2003	Fabrice Letertre	4717-7400	4652
28765	7590	06/16/2005	EXAMINER	
WINSTON & STRAWN LLP 1700 K STREET, N.W. WASHINGTON, DC 20006			TRINH, MICHAEL MANH	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/678,127

Applicant(s)

LETERTRE ET AL.

Examiner

Michael Trinh

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 20-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/6/2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 2822

DETAILED ACTION

*** This office action is in response to Applicant's election filed on March 31, 2005. Claims 1-25 are pending, in which claims 20-25 are non-elected, without traverse as treated.

Election/Restrictions

1. Applicant's election filed of Group I, method claims 1-19 in Paper mail date 3/31/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, and because the election is implicitly "without traverse", the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 20-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention. Election was made without traverse in Paper No.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-4,6-8,13,14,18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar et al (2003/0077885) taken with Koh et al (2002/0185687).

Applicant's admitted prior art teaches a method of producing a product substrate, which comprises: providing a donor wafer that is substantially free of foreign atomic species;

Art Unit: 2822

implanting atomic species into the donor wafer 6 to a preselected depth therein to form a weakened zone 4 below a bonding face of the donor wafer to define a transfer layer 5 between the weakened zone and the bonding face, the weakened zone being configured to facilitate detachment of the transfer layer 5 (Figs 1A-1D; paragraphs 58-64; Figs 2A-2I; paragraphs 66-77); bonding the donor wafer 6 at the bonding face to a support 7 (Fig 1C); detaching the transfer layer from the donor wafer along the weakened zone to obtain a product substrate that comprises the support and the transfer layer (Fig 1D,2C). Re further claims 3-4, wherein the semiconductor device as taught by Koh is formed on the transfer layer 3 (Figs 21A-21D) so that foreign atomic species is diffused into the transfer layer after detaching the transfer layer 3 from the donor wafer, as disclosed in the Applicant's admitted prior art (present specification page 1-3), wherein, re further claim 4, the atomic species in the transfer layer 15 is at smaller depth than the weakened zone 14 (Figs 2B-2C). Re claim 6, wherein bonding layers 8 are formed at the bonding face (Fig1C; paragraph 63). Re claim 7, wherein the bonding layer 8 is configured to form a buried insulator in the product SOI substrate (Fig 1D; paragraph 64). Re claim 8, wherein transfer layer comprises a Group III-V semiconductor (paragraph 24). Re claim 13, wherein the implanted ion species include hydrogen (paragraph 59). Re claim 14, wherein the support material 7 is mechanically stronger than the transfer layer 3 (Figs 1C; paragraph 63). Re claim 18, wherein the detaching of the donor wafer 1 is achieved by applying stress to the weakened zone (paragraphs 64,73-75).

Re claims 1 and 19, Aspar teaches forming an electronic device in the thin transfer layer, but does not teach diffusing atomic foreign species into the transfer layer, wherein the foreign species is selected to modify at least one of the electrical or optical properties of the transfer layer.

However, Koh teaches (at Figs 21A-21D; paragraphs 0183) diffusing atomic foreign species into the transfer layer 3, wherein the foreign species is selected to modify at least one of the electrical or optical properties of the transfer layer 3 formed on the support layer 1,2.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a semiconductor device of Applicant's admitted prior art by employing a doping technique, such as diffusion technique, to diffuse atomic foreign species into the transfer layer, as taught by Koh. This is because of the desirability to modify at least

Art Unit: 2822

one of the electrical or optical properties of the transfer layer, wherein the diffusion and implantation are alternative techniques for substitution in doping a transfer layer in forming a semiconductor device.

Re further claim 2-4, wherein the semiconductor device as taught by Koh is formed on the transfer layer 3 (Figs 21A-21D) so that foreign atomic species is diffused into the transfer layer after detaching the transfer layer 3 from the donor wafer in Aspar so that an electronic device can be formed in the transfer layer 5 (Figs 1D). Re further claims 3-4, wherein, as shown in Figures 2A-2F of Aspar, device regions are formed in the active layer prior to detaching the transfer from the donor wafer and wherein the semiconductor device as taught by Koh is formed on the transfer layer 3 (Figs 21A-21D) so that foreign atomic species is diffused into the transfer layer after detaching the transfer layer 3 from the donor wafer. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to introducing atomic species for modifying properties either after or before forming the transfer layer, as taught by Aspar and Koh, because of the desirability to form an electronic device in the transfer layer, wherein the order of doping can be obviously reversed so that electrical or optical properties of the transfer layer can be modified in an effective manner.

5. Claims 5,9-12,17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar et al (2003/0077885) taken with Koh et al (2002/0185687), as applied to claims 1-4,6,7,13,14,18-19 above, and further of Applicant's admitted prior art.

Aspar and Koh teach a method of producing a product substrate as applied to claims 1-4,6,7,13,14,18-19 above,

Re claims 9-12, Aspar and Koh do not teach diffusing the foreign atomic species render the transfer layer to be semi-insulating (claim 9), wherein, re claim 10, the transfer layer is made of indium phosphide, wherein re claim 11, the foreign atomic species comprises at least one of iron or rhodium, wherein re claim 12, the foreign atomic species comprises a shallow acceptor and a shallow donor.

However, Applicant's admitted prior art teach (at present specification page 3, lines 4-38, and page 1, line 30 through page 3) diffusing the foreign atomic species render the transfer layer of indium phosphide to be semi-insulating (claims 9-10), wherein, re claims 11-12, the foreign

Art Unit: 2822

atomic species comprises at least one of iron, wherein re claim 12, the foreign atomic species of irons and phosphorous comprises a shallow acceptor and a shallow donor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a product substrate of Aspar by diffusing the foreign atomic species of iron and phosphorous to render the transfer layer of indium phosphide to be semi-insulating, as taught by Applicant's admitted prior art. This is because of the desirability to form a product substrate for a wide range materials so that an electronic device can be formed in the thin transfer layer.

Re claims 5 and 17, Aspar does not teach thinning the transfer layer after detaching. However, Applicant's admitted prior art also teaches (at present page 1, lines 16-20) to thinning to remove and polish the transfer layer so as to have a thickness of a few hundred or tens of nanometers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a product substrate of Aspar by thinning to remove and polish the transfer layer as taught by Applicant's admitted prior art. This is because of the desirability to polishing the transfer layer so as to have a smooth surface and to form a thin transfer layer. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of the prior art's range of thickness of few hundred nanometer, as taught by Applicant's admitted prior art, which is within the range of applicant's claims of less than 10 microns, because it has been held to be obvious to select a value in a known range by optimization for the best results, and would be an unpatentable modification, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 104 USPQ 233,255 (CCPA 1955); *In re Waite* 77 USPQ 586 (CCPA 1948); *In Re Swanson* 56 USPQ 372 (CCPA 1942); *In Re Sola* 25 USPQ 433 (CCPA 1935); and *In Re Dreyfus* 24 USPQ 52 (CCPA 1934).

6. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar et al (2003/0077885) taken with Koh et al (2002/0185687), as applied to claims 1-4,6,7,13,14,18-19 above, and further of Bedell (2005/003229).

Art Unit: 2822

Aspar and Koh teach a method of producing a product substrate as applied to claims 1-4,6,7,13,14,18-19 above,

Re claims 15-16, Aspar and Koh do not teach further epitaxially growing an epitaxial layer on the transfer layer of the substrate after the detaching (claim 15), wherein, re claim 16, the epitaxial layer has a lattice structure that is different than that of the transfer layer.

However, Bedell teaches (at Figs 1A-1C; paragraphs 36-39;34-37) epitaxially growing an epitaxial layer 16, such as SiGe, having a lattice structure that is different than that the transfer layer 14.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a product substrate of Aspar by epitaxially growing an epitaxial layer, such as SiGe, having a lattice structure that is different than that the transfer layer, as taught by Bedell et al. This is because of the desirability to form a high quality, substantially relaxed SiGe on insulator substrate material.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0956.
Oacs-16



Michael Trinh
Primary Examiner